

# Lecture on Humanoid Robot Control

Summary:

The humanoid robots are among the most complex robotic platforms and the most challenging to control. The main purpose of this lecture is to give insights into the control of humanoid robots and generating dynamically stable walking patterns. To this end, a general introduction to robotics will be given at the beginning of the lecture and the application to the case of humanoid robots will be investigated afterward.

The lecture will cover the following topics:

*I. General introduction to robotics*

- Forward kinematics; homogenous matrices; frame transformations
- Geometrical and algebraic solutions of inverse kinematic problem; Jacobian matrix; numerical inverse kinematics
- Forward and inverse dynamic

*II. Humanoid Robot Control*

- Stability criteria; Zero Moment Point (ZMP) concept
- Walking pattern generation

## **Examination:**

The evaluation of students will be done through an oral examination.

*Notice: The Lecture will given in English at  
IWR, NF 368 : Room 532  
Monday 11:00 to 13:00*

*For more informations, please contact Dr. Wael Suleiman:  
wael.suleiman@iwr.uni-heidelberg.de*